REMARKS

Claims 1-24 are pending in the application. Claims 1-18, 20-22 and 24 are rejected. Claims 19 and 23 are objected to as being dependent on a rejected base claim.

Applicant appreciates the Examiner's withdrawal of the rejections over Burns et al. (US 5,750,610) in view of the certified translation of the priority German patent application DE 196 48 797.8.

I. Editorial amendments to specification

In the amendments above, the Applicant has presented minor editorial corrections. Specifically, editorial comments by the translator are deleted. More specifically, the Examiner embedded an indication of uncertainty as to the numerical digits in the original German language text. The editorial corrections presented in the amendments above are based on Applicants' review of a clear copy of the original German language text.

II. Claims 19 and 23 are in condition for allowance.

Claims 19 and 23 are objected to nearly as being dependent on a rejected base claim. Applicant traverses the rejection for the reasons stated with respect to the patentability of the respected base claim. In the amendments above, Applicant has rewritten claim 19 in independent form without any change in scope or content of the claim. Claim 23 depends directly from claim 19. Claims 19 and 23 are in condition for allowance.

III. Each of Claims 1-2, 9-12, 14-15, 17 and 21-22 is Patentable over Lentz (US 3,122,520)

Claims 1-2, 9-12, 14-15, 17 and 21-22 are rejected under § 102(b), or in the alternative under § 103(a), over Lentz. Applicant respectfully traverses the rejection.

Each of claims 1-2, 9-12, 14-15, 17 and 21-22 is patentable over Lentz, because Lentz fails to disclose, teach or suggest each and every element of the claim. Nothing in

Lentz has been identified, which would motivate one skilled in the art to modify Lentz in a manner that would yield the subject matter of any of the claims.

Claim 1 recites a process for preparation of organically modified aerogels with permanently hydrophobic surface groups. The method of claim 1 comprises (a) introducing a lyogel into a reactor, (b) washing the lyogel introduced into the reactor in step a) essentially free of water with an organic solvent, (c) surface-silylating the lyogel obtained in step b) with silylating agent comprising surface-silylating agent of certain formula to produce a surface-silylated lyogel; and (d) drying the surface-silylated lyogel obtained in step (c) to obtain an aerogel. The surface-silylating agent comprises a disiloxane of formula **$R_3Si\text{-}O\text{-}SiR_3$**.

In contrast, Lentz fails to disclose, teach or suggest a method in which silylating agent comprising disiloxane $R_3Si\text{-}O\text{-}SiR_3$ is added to a lyogel that has first been washed essentially free of water with an organic solvent.

In certain alternatives, Lentz states that its hydrogel can be converted to an organogel by mixing with organic solvent, and that the solvent can be added before, after or simultaneous with addition of its organosilicon compounds. Any organic solvent immiscible with water can be employed, according to Lentz. Amongst numerous alternative materials, disiloxanes including hexamethyldisiloxane are identified as examples of water immiscible organic solvents that are suitable for use as the solvent and serve also as a reactant with the silica hydrogel. But nowhere in Lentz is there any teaching or suggestion to use organic solvent to wash Lentz's hydrogel essentially free of water, followed by addition of disiloxane silylating agent $R_3Si\text{-}O\text{-}SiR_3$.

The Examiner acknowledges that Example 10 of Lentz uses trimethylchlorosilane and fails to use a disiloxane having the formula of the surface-silylating agents of present claim 1. Accordingly, example 10 fails to teach each and every element of the claims, and therefore, Lentz fails to anticipate the claims.

The Examiner asserts, however, that Lentz would suggest to one skilled in the art that substitution of hexaethyldisiloxane for trimethylchlorosilane would provide similar

and successful results. But the Examiner fails to identify proper basis for such conclusion, and Applicant respectfully disagrees.

The Examiner asserts, but fails to provide suitable basis for, a conclusion that substitution of hexaethyldisiloxane for trimethylchlorosilane in Example 10 would provide similar and successful results. In fact, the Examiner's position is inconsistent with the teaching of Lentz and the structural dissimilarities between trimethylchlorosilane and hexaethyldisiloxane, e.g., the obvious lack of chloro groups in hexaethyldisiloxane, clearly undermine the Examiner's position.

Accordingly, Lentz fails to teach or suggest a process for the preparation of organically modified aerogels with permanently hydrophobic surface groups, comprising (a) introducing a lyogel into a reactor; (b) washing the lyogel introduced into the reactor in step a) *essentially free of water* with an organic solvent; (c) surface-silylating the lyogel obtained in step b) with a surface-silylating agent to produce a surface-silylated lyogel; and (d) drying the surface-silylated lyogel obtained in step c) to obtain an aerogel, wherein the surface-silylating agent in step c) comprises a disiloxane of formula I

$$R_3Si\text{-}O\text{-}SiR_3 \quad (I)$$

wherein the residues R, independently of one another, identically or differently, signify in each case a hydrogen atom or a nonreactive organic residue that is linear, branched, cyclic, saturated or unsaturated, or aromatic or heteroaromatic, as recited by claim 1.

Each of claims 2, 9-12, 14-15, 17 and 21-22 depend directly or indirectly from claim 1 and are patentable over Lentz for at least the same reasons.

Each of claims 1, 2, 9-12, 14-15, 17 and 21-22 is patentable over Lentz, because no suggestion or motivation is identified by the Examiner to modify Lentz to arrive at the subject matter of the present claims. Citations cannot properly be modified by speculation, arriving at the claimed invention by using the applicant's own disclosure as a road map to guide the modification.

In this case, Lentz cannot properly be modified in the manner suggested by the Examiner, because the primary thrust of Lentz is the use of certain defined organosilicon compounds -- silanes and siloxanes -- that do not include the disiloxanes of present

claim 1. And, further, nothing in Lentz could suggest to one skilled in the art, that any improvement is needed or even possible in an aerogel's properties, production costs etc., by washing a precursor hydrogel essentially free of water prior to hydrophobing with silylating agent comprising such disiloxane.

Accordingly, the rejection of the claims is in error and should be withdrawn.

IV. Claim 13 is Patentable over Lentz

Claim 13 is rejected under 103(a) over Lentz. Applicant respectfully traverses the rejection.

Claim 13 depends directly from claim 1. As discussed above in Section I, Lentz fails to teach or suggest the subject matter of claim 1. Accordingly, claim 13 is patentable for at least the same reasons.

V. Each of Claims 3-8, 16, 18, 20 and 24 is Patentable over Lentz in view of Frank et al.

Claims 3-8, 16, 18, 20 and 24 are rejected under § 103(a) over Lentz in view of Frank et al. (US 5,866,027). Applicant respectfully traverses the rejection.

Each of claims 3-8, 16, 18, 20 and 24 depend directly or indirectly from claim 1. As discussed above in Section I, Lentz fails to teach or suggest the subject matter of claim 1. Frank et al. fails to cure the deficiencies of Lentz. That is, the combination of Lentz and Frank et al. does not support an obviousness rejection because their combination does not make the subject matter of the claims obvious as a whole. Frank et al. describes a merely optional solvent exchange prior to hydrophobing.

Accordingly, since, neither Frank et al nor Lentz teaches or suggests treating a lyogel with the present disiloxanes $R_3Si\text{-}O\text{-}SiR_3$ after the lyogel has been washed essentially free of water with organic solvent, and since there is no identified problem in either citation addressed by such modification of their disclosure, the combination of Lentz and Frank et al. fails to support the rejection. Therefore, each of claims 3-8, 16, 18, 20 and 24 is patentable over the combination of Lentz and Frank et al.

When each of Lentz and Frank et al. is considered as a whole, one skilled in the art would not be motivated to combine Lentz and Frank et al. Frank et al. addresses a problem of mechanical stability of a xerogel for insulation purposes, where the xerogels must be usable substantially in their native form. Frank et al. uses its xerogels in "webs or mats" of fibers (Col.5, lines 30-42) and in thin sheets or stacks of thin sheets (Col. 5, lines 49-55).

In contrast, Lentz is focused on making fillers to be compounded into rubber. Lentz includes a paragraph about other uses but provides no supporting disclosure and exemplifies only use as filler for silicone rubber. There is simply nothing in Lentz that would lead one skilled in the art to seek structural reinforcement of the Lentz aerogels. Nothing of record provides the motivation for one skilled in the art to combine Frank et al.'s discussion of mats of fibers to Lentz's discussion of filler aerogels.

Accordingly, each of claims 3-8, 16, 18, 20 and 24 is patentable over the combination of Lentz and Frank et al.

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VI. C nclusion

For the reasons stated above, each of claims 1-24 is patentable over the citations of record. Applicant respectfully requests withdrawal of all rejections and allowance of all claims.

Respectfully submitted,
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30 Jan 2003
Date

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I hereby certify that this correspondence is being deposited with the United States Postal Service as first class mail in an envelope addressed to: Assistant Commissioner for Patents, Washington, D.C. 20231 on:.

Rachelle Chery — 1/30/03
Rachelle Chery — *Date*

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
(003259.81131)

Appellant:	**Schwertfeger, Fritz**	**Group Art Unit: 1762**
U.S.S.N.:	**09/308,770**	**Examiner: K. Crockford**
Filed:	**28 October 1999**	
Title:	**METHOD FOR PRODUCING ORGANICALLY MODIFIED, PERMANENTLY HYDROPHOBIC AEROGELS**	

APPENDIX A

VERSION SHOWING CHANGES MADE

IN THE SPECIFICATION

The amendments to example 1 beginning on page 20 of the specification are shown below.

2 liters of a sodium water-glass solution (SiO_2 content of 6 wt.% and Na_2O:SiO_2 ratio of 1:3.3) are passed through a sheathed glass column (length = 100 cm, diameter = 8 cm), which is packed with 4 liters of an acidic ion-exchanger resin (styrene-divinylbenzene copolymer with sulfonic acid groups, commercially available under the name of ®Duolite C20) (at approximately 70 ml/min). The column is operated at a temperature of approximately 7°C. The silicic-acid solution exiting at the lower end of the column has a pH value of 2.3. This solution is brought to a pH of 4.7 for the polycondensation with a 1.0 molar NaOH solution. After this, the gel that forms is aged for another 3 hours at 85°C and then the water is exchanged for acetone with 3 liters of acetone. Then the acetone-containing gel is silylated with hexamethyldisiloxane at room temperature for 5 hours (2.5 wt.% hexamethyldisiloxane per gram of wet gel). After washing the gel with 3 liters of acetone, drying of the gel is conducted in air (3 hours at

40°C, then 2 hours at 50°C and 12 hours at 150°C). The thus-obtained transparent aerogel has a density of 015 g/cm^3, a heat conductivity of 15 ~~[16?]~~ mW/mK, a specific surface according to BET of 600 m^2/g and is permanently hydrophobic.

The amendments to example 3 on page 22 of the specification are shown below.

The hydrogel is produced as described in Example 2. The hydrogel aged for one hour at 85°C is then washed with 3 liters of warm water and the water is exchanged for acetone with 3 liters of acetone. Then the acetone-containing gel is silylated with hexamethyldisiloxane (2.5 wt.% hexamethyldisiloxane per gram of wet gel) in the presence of 0.1 wt.% trimethylchlorosilane (~~0.?~~0.1 wt.% trimethylchlorosilane per gram of wet gel) for 5 hours at room temperature. After washing the gel with 3 liters of acetone, it is dried in air (3 hours at 40°C, then 2 hours at 50°C and 12 hours at 150°C).

IN THE CLAIMS

Kindly amend the claims as follows:

Claim 19. (Thrice Amended) A process ~~in accordance with claim 1~~ for the preparation of organically modified aerogels with permanently hydrophobic surface groups, comprising:

a. introducing a lyogel into a reactor;

b. washing the lyogel introduced into the reactor in step a) essentially free of water with an organic solvent;

c. surface-silylating the lyogel obtained in step b) with a surface-silylating agent to produce a surface-silylated lyogel; and

d. drying the surface-silylated lyogel obtained in step c) to obtain an aerogel,

wherein the surface-silylating agent in step c) comprises a disiloxane of formula I

$R_3Si\text{-}O\text{-}SiR_3$ (I)

wherein the residues R, independently of one another, identically or differently, signify in each case a hydrogen atom or a nonreactive organic residue that is linear, branched, cyclic, saturated or unsaturated, or aromatic or heteroaromatic, and wherein, prior to step c), the lyogel is washed with a solution of an orthosilicate capable of bringing about condensation, of formula $R^1_{4-n}Si\text{-}(OR^2)_n$ wherein n = 2 through 4 and R^1 and R^2, independently of one another, are hydrogen atoms, linear or branched C_1-C_4 alkyl residues, cyclohexyl residues or phenyl residues.